

WHAT IS CLAIMED IS:

- QX*
1. A semiconductor device comprising:
a Cu film provided above a main surface of
a semiconductor substrate and used as a wiring;
5 an intermediate layer formed at least on the Cu
film; and
an Al film formed on the intermediate layer and
used as a pad;
wherein the intermediate layer comprises a
10 refractory metal nitride film and a refractory metal
film formed on the refractory metal nitride film.
 2. The semiconductor device according to claim 1,
wherein the intermediate layer has a first portion
which contacts the Cu film and a second portion which
15 does not contact the Cu film, and an insulating film
contacts the second portion.
 3. The semiconductor device according to claim 1,
wherein the refractory metal film contains at least
one refractory metal and the refractory metal nitride
20 film contains at least one refractory metal that is
identical to the at least one refractory metal
contained in the refractory metal film.
 4. The semiconductor device according to claim 1,
wherein the refractory metal film contains at least one
25 metal selected from the group consisting of Ta, Nb, Ti,
W and V, and the refractory metal nitride film contains
at least one metal selected from the group consisting

of Ta, Nb, Ti, W and V.

5. A semiconductor device comprising:

a Cu film provided above a main surface of
a semiconductor substrate and used as a wiring;

5 an intermediate layer formed at least on the Cu
film; and

an Al film formed on the intermediate layer and
used as a pad;

10 wherein the intermediate layer comprises a
refractory metal film and a refractory metal nitride
film formed on the refractory metal film.

15 6. The semiconductor device according to claim 5,
wherein the intermediate layer has a first portion
which contacts the Cu film and a second portion which
does not contact the Cu film, and an insulating film
contacts the second portion.

20 7. The semiconductor device according to claim 5,
wherein the refractory metal film contains at least
one refractory metal and the refractory metal nitride
film contains at least one refractory metal that is
identical to the at least one refractory metal
contained in the refractory metal film.

25 8. The semiconductor device according to claim 5,
wherein the refractory metal film contains at least one
metal selected from the group consisting of Ta, Nb, Ti,
W and V, and the refractory metal nitride film contains
at least one metal selected from the group consisting

of Ta, Nb, Ti, W and V.

9. A semiconductor device comprising:

a Cu film provided above a main surface of
a semiconductor substrate and used as a wiring;

5 an intermediate layer formed at least on the Cu
film; and

an Al film formed on the intermediate layer and
used as a pad;

10 wherein the intermediate layer comprises a first
refractory metal film, a refractory metal nitride film
formed on the first refractory metal film, and a second
refractory metal film formed on the refractory metal
nitride film.

15 10. The semiconductor device according to claim 9,
wherein the intermediate layer has a first portion
which contacts the Cu film and a second portion which
does not contact the Cu film, and an insulating film
contacts the second portion.

11. The semiconductor device according to claim 9,
20 wherein the first refractory metal film contains at
least one refractory metal, the refractory metal
nitride film contains at least one refractory metal
that is identical to the at least one refractory metal
contained in the first refractory metal film, and the
25 second refractory metal film contains at least one
refractory metal that is identical to the at least one
refractory metal contained in the first refractory

metal film.

12. The semiconductor device according to claim 9,
wherein the first refractory metal film contains at
least one metal selected from the group consisting of
Ta, Nb, Ti, W and V, the refractory metal nitride film
contains at least one metal selected from the group
consisting of Ta, Nb, Ti, W and V, and the second
refractory metal film contains at least one metal
selected from the group consisting of Ta, Nb, Ti, W
and V.